

IN THE CLAIMS

The following is a complete listing of the claims, and replaces all earlier versions and listings.

1. (Currently Amended) ~~Method~~ A method of turbocoding for the transmission of information in which, a first polynomial with binary coefficients $g(x)$ of degree d and with a constant term equal to 1 having been predetermined, first ~~of all said the~~ information is presented in the form of binary sequences \underline{u} of length

$$k = p - d,$$

where p is a predetermined multiple of ~~the~~ a period N of the polynomial $g(x)$, and then, for each of ~~said the~~ sequences \underline{u} , there is produced a triplet \underline{v} of binary sequences $(\underline{a}, \underline{b}, \underline{c})$ intended to be transmitted and obtained as follows:

~~=said the~~ sequence \underline{a} is of length p and obtained by extending the sequence \underline{u} by means of d “padding” padding bits so that the polynomial

$$a(x) = \sum_{i=0}^{p-1} a_i x^i$$

associated with \underline{a} is divisible by $g(x)$,

~~=said the~~ sequence \underline{b} is represented by the polynomial

$$b(x) = a(x) \cdot f_1(x) / g(x),$$

where $f_1(x)$ is a second polynomial with predetermined binary coefficients, without a common divisor with $g(x)$, and

~~=said the~~ sequence \underline{c} is represented by the polynomial

$$c(x) = a^*(x) \cdot f_2(x) / g^*(x),$$

where

$$a^*(x) = \sum_{i=0}^{p-1} a_i x^{\pi(i)},$$

where $\pi(i)$ is a predetermined permutation of the integers i lying between 0 and $(p-1)$, where $g^*(x)$ is a third polynomial with predetermined binary coefficients, of degree d and with a constant term equal to 1, $\pi(i)$ and $g^*(x)$ being chosen so that, whatever the polynomial $a(x)$ divisible by $g(x) \pmod{2}$, $a^*(x)$ is divisible by $g^*(x) \pmod{2}$, and where $f_2(x)$ is a fourth polynomial with predetermined binary coefficients, without a common divisor with $g^*(x)$, ~~characterized in that~~ in which there is taken for $\pi(i)$ the residue modulo p of the product $(i \cdot e)$, where e is a predetermined strictly positive integer, relatively prime with p , congruent with a power of 2 modulo N , and not congruent with a power of 2 modulo p , from which it results that $g^*(x)$ is identical to $g(x)$.

(In Claim 1, the following are meant to be underlined: u , v , a , b , c)

2. (Currently Amended) ~~Turbodecoding~~ A turbodecoding method, ~~characterized in that it~~ which makes it possible to decode received sequences which are decodable and which have been transmitted after having been coded by means of a turbocoding method according to Claim 1.

3. (Currently Amended) ~~Method~~ A method for determining a turbocoding method in which, a first polynomial with binary coefficients $g(x)$ of degree d and with a constant term equal to 1 having been predetermined, ~~first of all said~~ the information is presented in the form of binary sequences u of length

$$k = p - d,$$

where p is a predetermined multiple of the period N of ~~said the~~ polynomial $g(x)$, and then, for each of ~~said the~~ sequences \underline{u} , there is produced a triplet \underline{v} of binary sequences $(\underline{a}, \underline{b}, \underline{c})$ intended to be transmitted and obtained as follows:

~~said the~~ sequence \underline{a} is of length p and obtained by extending the sequence \underline{u} by means of d ~~padding~~ padding bits so that the polynomial

$$a(x) = \sum_{i=0}^{p-1} a_i x^i$$

associated with \underline{a} is divisible by $g(x)$,

~~said the~~ sequence \underline{b} is represented by the polynomial

$$b(x) = a(x) \cdot f_1(x) / g(x),$$

where $f_1(x)$ is a second polynomial with predetermined binary coefficients, without a common divisor with $g(x)$, and

~~said the~~ sequence \underline{c} is represented by the polynomial

$$c(x) = a^*(x) \cdot f_2(x) / g(x),$$

where

$$a^*(x) = \sum_{i=0}^{p-1} a_i x^{\pi(i)},$$

where $f_2(x)$ is a third polynomial with predetermined binary coefficients, without a common divisor with $g(x)$, and where $\pi(i)$ is the residue modulo p of the product $(i \cdot e^*)$, where e^* is a number determined in the following manner:

a) a certain number of different sequences \underline{u} are chosen to form ~~what~~ ~~will be referred to as the "representative set"~~ a representative set,

b) for each strictly positive integer number e less than p , congruent with a power of 2 modulo N and relatively prime with p :

~~the~~ a total binary weight PB of all ~~said~~ the triplets of binary sequences \underline{v} associated with the sequences \underline{u} belonging to ~~said~~ the representative set is calculated, and

[[~~-~~]] note is taken of the value $w(e)$, associated with this value of e , of the minimum weight amongst all these binary weights PB , and

c) in order to implement the coding, the value e^* of e which is associated with the largest value of ~~this~~ the minimum weight w is chosen.

(In Claim 3, the following are meant to be underlined: \underline{u} , \underline{v} , \underline{a} , \underline{b} , \underline{c})

4. (Currently Amended) ~~Device (901)~~ A device for coding sequences of data intended to be transmitted by means of a turbocoding method according to Claim 1, ~~characterized in that it has~~ having:

[[~~-~~]] means [[(30)]] for obtaining, for each sequence of data \underline{u} , said sequence \underline{a} associated with \underline{u} by extending the sequence \underline{u} by means of said d padding bits, and

[[~~-~~]] at least one turbocoder [[(40)]] having an interleaver π_1 able to effect the permutation provided for in said method.

(In Claim 4, the following are meant to be underlined: \underline{u})

5. (Currently Amended) ~~Decoding~~ A decoding device ~~(1101)~~ intended to implement a turbodecoding method according to Claim 2, ~~characterized in that it has~~ having:

[[~~-~~]] at least one turbodecoder (~~300~~) having two interleavers π_1 able to effect the permutation provided for in said method, and a deinterleaver π_2 able to reverse ~~this~~ the permutation[[~~-~~]]; and

[[~~-~~]] means (~~335~~) for producing a binary sequence \hat{u} by removing the last d bits of the estimated sequence \hat{a} obtained at the end of the turbodecoding of the received sequences $\underline{a'}$, $\underline{b'}$ and $\underline{c'}$ corresponding respectively to ~~said~~ the transmitted sequences \underline{a} , \underline{b} , and \underline{c} .

(In Claim 5, the following are meant to be underlined: \hat{u} , \underline{a} , \underline{b} , \underline{c} , $\underline{a'}$, $\underline{b'}$, $\underline{c'}$, \hat{a})

6. (Currently Amended) ~~Apparatus~~ An apparatus for transmitting coded digital signals (~~48~~), ~~characterized in that it has~~ having a coding device according to Claim 4, and ~~in that it has~~ means (~~906~~) for transmitting ~~said~~ the coded sequences \underline{a} , \underline{b} , and \underline{c} .

(In Claim 6, the following are meant to be underlined: \underline{a} , \underline{b} , \underline{c})

7. (Currently Amended) ~~Apparatus~~ An apparatus for receiving coded digital signals (~~333~~), ~~characterized in that it has~~ having a decoding device according to Claim 5, and ~~in that it has~~ means (~~1106~~) for receiving ~~said~~ the sequences $\underline{a'}$, $\underline{b'}$, and $\underline{c'}$.

(In Claim 7, the following are meant to be underlined: $\underline{a'}$, $\underline{b'}$, $\underline{c'}$)

8. (Currently Amended) ~~Telecommunications~~ A telecommunications network, ~~characterized in that it has~~ having at least one apparatus according to Claim 6 or Claim 7.

9. (Currently Amended) ~~Data~~ A data storage means, which can be read by a computer or a microprocessor, storing instructions of a computer program, ~~characterized in that it~~ which makes it possible to implement a method according to any one of Claims 1 to 3.

10. (Currently Amended) Means of storing data which are removable, partially or totally, which can be read by a computer and/or a microprocessor, storing instructions of a computer program, ~~characterized in that it~~ which makes it possible to implement a method according to any one of Claims 1 to 3.

11. (Currently Amended) ~~Computer~~ A physically-embodied, executable computer program containing instructions such that, when said program controls a programmable data processing device, ~~said~~ the instructions cause the data processing device implements a method according to any one of Claims 1 to 3.